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VIEWS, NEWS AND INTERVIEWS.

Mr. Chas. S. Gleed, president of the Electric Railway of Topeka, Kansas, was recently elected director of the Atchison, Topeka and Santa Fe Railway, and is now in New York. At the time of his election Mr. Eugene Ware, of Fort Scott, Kansas, a poet and practitioner at the law, who occasionally reads Shakespeare as well as the Bible, telegraphed Mr. Gleed as follows:

"Though director now, thou may yet be Thane of Cawdor."

Appreciating the opportunity and the euphony, Mr. Gleed replied:

Telegram received, saying "Though director now, I may yet be Clam of Chowder." Thank you!

Mr. Ware is now hunting for the telegraph operator, and Mr. Gleed smiles quietly and feels that he is one or two ahead of the Fort Scott bard.

Telephone inventors are said to be in line in front of the doors of the leading opposition companies. The boys haven't had an opportunity for many a day.

There are nine street railway associations in the United States. The States of New York, Massachusetts, New Jersey, Maine, Pennsylvania, Ohio, Connecticut and Michigan each have an association in addition to the American Street Railway Association, which holds its annual meeting in Atlanta, Ga., next week.

Now the "Phœnix" telephone rises in the magneto field and proposes to furnish service in New York at $2 a month. It has fun ahead.

Car fenders are numerous, and different ones are being tried in all the cities of the Union. St. Louis has two or three just now on trial.

SPECIAL NOTICE.

All copy for the next issue of the ELECTRICAL REVIEW, the issue that will be distributed at the Atlanta Street Railway Convention, must be in this office by Friday noon, October 12. The persuasive and progressive advertiser will understand. So will all our correspondents.

Rapid Transit in New York.

The Rapid Transit Commission met last week. The business of the session was to listen to the preliminary report of Engineer William B. Parsons upon his studies of rapid transit systems abroad.

Some weeks later Mr. Parsons will submit a more lengthy and complete account of his observations. His report at the time consisted of 34 pages of typewritten matter, accompanied by 27 illustrations, six of which were photographs and the others drawings, giving views of roads already constructed and others being built in Europe.

Mr. Parsons reported that he had not concluded from what he learned that any one system of transit abroad should be recommended for adoption in this city.

The only statement in the report approaching a deduction was that electricity should undoubtedly be the motive power of any road in the future. The experiences of some of the larger capitals of Europe proved this to his satisfaction.

Electricity, the report continued, had proven itself in London and Liverpool to be extremely successful.

He reported that he found no underground road operated by steam in which the air could be kept free from smoke, gas and steam, and in a fit condition for human travel.

It was his belief that no system yet constructed meets the necessities of the situation here. Some new system might be devised, New York benefiting by the experience of European capitalists, taking one feature of this road and another of that road.

FIG. 1.—200 KILOWATT GENERAL ELECTRIC SUB-STATION TRANSFORMER.
(See following pages.)

Car Companies Will Consolidate.

The Laclede Car Company, the St. Louis Car Company, the American Car Company and the Brownell Car Company, all of St. Louis, and the St. Charles Car Company, of St. Charles, Mo., are soon to unite in a syndicate which will combine them practically into one concern, the largest of the kind in the world. All of these companies manufacture electric cars. There are a number of strong Eastern houses not in the consolidation; also Pullman, of Chicago.

ALL ABOARD FOR ATLANTA.

THE REPRESENTATIVES OF ELECTRIC TRACTION FROM THE EAST, THE WEST, THE NORTH AND SOUTH WILL BIVOUAC AT ATLANTA NEXT WEEK.

The Convention of the American Street Railway Association to be held at Atlanta, October 17 to 19, inclusive, promises to be the largest and most interesting and important meeting the association has ever held. The programme is a carefully arranged and up-to-date one, and in addition a number of special papers are expected, among them being one by Mr. J. H. Vail, the eminent electrical engineer, on the new "booster" system for electric railways.

The large membership of the Street Railway Association is in itself enough to make a very strong, impressive gathering; and when in addition the manufacturers have turned out in force sufficient to almost fill with their exhibits the immense exposition hall, it is evident that the interest in this convention is very great and that the attendance will be of a large and enthusiastic nature. The railroads of the country have nearly all given the reduced rate of a fare and one-third for the round trip, and special trains are to be run from New York and Chicago. The train over the Royal Blue and the Norfolk & Western is to leave from the foot of Liberty street, New York city, at 3 P. M., Monday, October 15, and is announced to arrive at Atlanta at 6 o'clock P. M. the next day. The special train over the Pennsylvania and the Southern Railway will leave from foot of Cortlandt street, New York, at 4.30 P. M. Monday, and will arrive at Atlanta at 4 P. M. the next day, making the quick time of 23½ hours. Both of these trains, the energetic representatives state, have secured full quotas of passengers and

the trains will go through on time and will be first-class in all respects. The Seaboard Air Line will also take out a personally conducted party on Monday, leaving on the Pennsylvania at 3.20 P. M. Monday and arriving at Atlanta at 4 P. M. Tuesday. The Atlanta Coast Line announces its time table, which takes passengers from New York at 9 A. M. and lands them in Atlanta by noon the next day. There is no lack of facilities for getting to this convention—if you have the fare.

The programme which has been announced before in the ELECTRICAL REVIEW is published here again in full:

"Can the T Rail be Satisfactorily Used in Paved Streets?" Joel Hurt, president Atlanta Consolidated Street Railway, Atlanta, Ga.; S. Hendrie, manager Wyandotte and Detroit River Railway, Detroit, Mich.; H. J. Crowley, engineer Atlanta Consolidated Street Railway, Atlanta, Ga.

"City and Suburban Electric Railways." E. C. Foster, superintendent Lynn and Boston Railroad, Boston, Mass.

"Mail, Express and Freight Service on Street Railways." R. McCulloch, electrical engineer Citizens' Railway, St Louis.

"Best Method of Treating Accidents and Complaints." John B. Parsons, general manager West Chicago Street Railroad Company, Chicago.

"Street Car Wheels and Axles." D. S. Cook, electrical engineer Trenton Passenger Railway Company, Trenton, N. J.

"Transfer and Commutation." Rodney Curtis, president Denver Tramways Company, Denver, Colo.

"T Rail Construction of the Terre Haute Street Railway Company, Terre Haute, Ind." M. F. Burke, superintendent Terre Haute Street Railway Company, Terre Haute, Ind.

"A Standard Form for Accounts for Street Railways." H. I. Bettis, consulting engineer Atlanta Consolidated Street Railway Company, Atlanta, Ga.

The following street railway officials will attend the Atlanta convention. The list is but a partial one, as additions are continually coming in:

Atlanta, Ga.—Joel Hurt, president; E. Woodruff, vice-president; T. K. Glinn, secretary; R. J. Lowry, treasurer; H. N. Hurt, superintendent; N. W. L. Brown, electrician; Atlanta Consolidated Street Railway.

Augusta, Ga.—D. B. Dyer, president; W. E. Moore, superintendent; Augusta Railway Co.

Birmingham, Ala.—Robert Jemison, vice-president; Jas. A. Stratton, secretary; J. B. McClary, superintendent; Geo. H. Harris, electrician; Birmingham Railway and Electric Co.

Bloomington, Ill.—W. H. Patteron, vice-president Bloomington City Railroad Co.

Brooklyn, N. Y.—Col. John N. Partridge, president Brooklyn City and Newtown Railroad Company.

Charleston, S. C.—T. W. Passailaigue, president; P. J. Balaguer, secretary; Enterprise Railroad.

Carbondale, Pa.—John W. Aitken, president; D. J. Duncan, superintendent; Carbondale Traction Co.

Champaign, Ill.—B. F. Harris, Jr., president Urbana & Champaign Street Railroad.

Chicago, Ill.—T. C. Penington, treasurer; R. L. Gaith, purchasing agent; Chicago City Railroad Co.

Cincinnati, Ohio.—John Kilgour, president; Geo. N. Stone, director; B. L. Kilgour, electrical engineer; B. L. Baldwin, mechanical engineer; P. Leen, master car builder; Cincinnati Street Railroad Co. H. P. Bradford, general manager Cincinnati Incline Plane Railroad.

Cleveland, Ohio.—John J. Stanley, superintendent Cleveland Electric Railroad Co.

Columbia, S. C.—J. Q. Marshall, president; Alfred Wallace, superintendent; Columbia Electric Street Railroad Co.

Columbus, Ind.—John S. Crump, proprietor Electric Street Railway.

Covington, Ky.—Thos. M. Jenkins, superintendent South Covington and Cincinnati Street Railroad Co.

Dallas, Texas.—Robt. S Wakefield, superintendent Queens City Railway Co.

Elmira, N. Y.—C. M. Tompkins, president; H. H. Hallock, secretary; Wm. W. Cole, secretary; Westside Railway Co.

Fishkill-on-Hudson, N. Y.—John T. Smith, president Citizens' Street Railway Co.

Gainesville, Ga.—D. E. Evans, president Gaines Street Railroad Co.

Gerardville, Pa.—E. W. Ash, general manager Schuylkill Traction Co.

Grand Rapids, Mich.—G. S. Johnson, general manager Consolidated Street Railway Co.

Hamilton, Ont.—E. Martin, vice-president; J. B. Griffith, secretary; Hamilton Street Railway Co.

Harrisburg, Pa.—F. B. Musser, superintendent East Harrisburg Passenger Railway.

Hartford, Conn.—E. S. Goodrich, president Hartford Street Railway Co.

Indianapolis, Ind. — Thos. H. McLean, general manager Citizens' Street Railroad Co.

Keokuk, Iowa.—J. C. Hubinger, president Keokuk Electric Railway Co.

Lawrence, Mass.—N. E. Morton, superintendent; A. E. Butler, director; Lowell, L. and H. Railroad Co.

Louisville, Ky.—T. J. Minary, general manager Louisville Railway Co.

Mobile, Ala.—J. H. Wilson, vice-president Mobile Railway Co.

Nashville, Tenn.—W. H. Jackson, president; E. G. Connette, general

(Continued on page 175.)

A NEW ELECTRIC SYSTEM.

THE GENERAL ELECTRIC COMPANY'S MONOCYCLIC ALTERNATING SYSTEM FOR SIMULTANEOUS LIGHT AND POWER WORK.

The transmission of power by electricity may, without fear of contradiction, be said to be the most important development in the great science to which we are devoted. The success of almost all industrial operations being dependent to a large extent upon the possibility of procuring and utilizing motive power, the less costly its production and the more facile its utilization the more favorable become industrial conditions in general and the greater the consequent benefit both to the producer and consumer.

Our columns have recorded each and every advance made in the development of the electrical transmission of power, and our readers are aware that it has already reached a very high state of perfection. Indeed, it is safe to say that any problem of electrical power transmission which is likely to arise commercially can be solved so far as the feat of engineering goes, and the expediency of the work finds its sole limitation in the question of cost.

The ideal system of power transmission must of necessity fulfill a somewhat complicated set of conditions. It must be possible to overcome distances ranging from a few hundred feet to many miles without serious loss efficiency and to utilize the power obtained at either of these distances for motors and arc and incandescent lamps. Any system which cannot comply with these requirements is necessarily limited in its application, although to accomplish these widely diverse purposes, it does not follow that the same system will be used.

So far as surmounting the difficulty presented by distance goes, the most important consideration is the voltage. For reasons well known it is imperative that on long lines high voltages be used, and in every case as high a voltage should be used as the engineering conditions render practicable. To reduce this voltage current to the proper pressure for distribution purposes, it is necessary in the majority of cases to employ some voltage reducing device, such as a motor generator for direct current and transformer for alternating current.

In order to unite efficiency and economy in all problems of electrical power transmission, the General Electric Company has brought out in this country three methods, each of which has its important use. The direct current for short distances, where high voltage is unnecessary; the high frequency alternating current, where self-starting motors and great distances are not an important factor in the problem; and, finally, the low frequency alternating system, either three-phase or monocyclic. For distribution of alternating currents for power with incidental lighting and for all long-distance transmission, where the cost of the line is a considerable item of expense, the three-phase system has been devised and has answered all the great expectations based on it, while for distribution of alternating currents for lighting with incidental power, the low frequency, single-phase alternating system has been invented, and in this system consists what is the most recent and most promising innovation in the electrical power transmission field. To it has been given the name monocyclic, and it constitutes a complete central station lighting and power system. It takes the place of the well-known high-frequency system in central station work, operating transformer systems and distributing net works in the same manner, with the additional advantage of being able to supply the current to motors by means of a balance wire which is carried only to places where the motors are to be used. The principal advantages attained by the monocyclic system are the following: It can operate incandescent and arc lamps and motors in parallel from the same generator and even from the same transformer; it solves the problem of the operation of alternat-

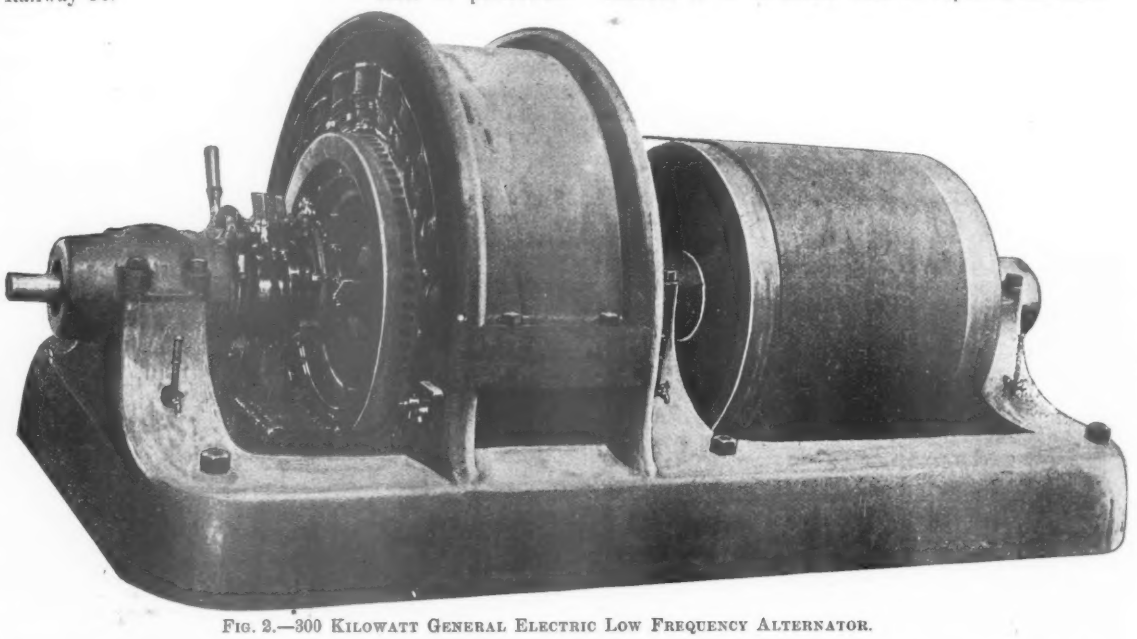

FIG. 2.—300 KILOWATT GENERAL ELECTRIC LOW FREQUENCY ALTERNATOR.

ing current motors which has for so long proved the *bete noire* of the electricians—the motors employed being not only equal but claimed to be superior to continuous current motors in their constancy of speed, great simplicity and absolute reliability, commutators, collector rings, brushes or moving wires being entirely absent. They can be started at full load with normal current. By the flexibility of voltage incident to the use of the transformer it is able to operate low tension net-works on the Edison three wire system in the same way as the continuous current lighting system, and even with the use of the same overhead or underground mains. It affords a better balance and entails less expenditure of copper by replacing the heavy low tension feeders with high tension primaries of much less cross section feeding into the mains by transformers.

It offers th same simplicity as the ordinary alternating current system, and differs from it only in its ability to operate high grade motors by means of the third wire which is similar to the neutral wire of the Edison three wire system. It allows perfect operation of the whole system of the generators in parallel, the whole lighting and power station being operated from three bus bars, only the third bus bar being provided for the supply of current to the motors. By the use of two transformers, three phase, quarter phase or any other type of alternating motor may be supplied with current. The low frequency of 7,200 alternations per minute used with this system reduces the effects of line inductance and is consequently favorable to transmission over long distances. The generators and motors are both slow speed, and for both generators and transformers are claimed an efficiency and regulation never before attained.

As above said, the lighting system is operated in the same way as in the old alternators by two wires and one transformer, which supplies a two wire or Edison three wire system from its secondary terminals. From the same mains, however, motors are operated, and in this case two transformers are used, connected between the main wires and the supplementary or power wire; in which, by the action of the motors, an intermediate but laterally displaced voltage is established and maintained. For this purpose, the generator armature contains besides the main coil a small supplementary or teaser coil, which is connected with one end to the center of the main coil, while the other end is led to the third collector ring. It is obvious that this third collector ring is used only for supplying motors, while the lighting current passes exclusively through the main collector rings, and that the third or power wire needs to be carried only to where motors are located, and, since it does not convey large currents, needs to have a small cross section only.

The frequency for the monocyclic system has been fixed at 7,200 alternations, or 60 cycles per second. This frequency is better adapted to the general requirements of incandescent lighting than any other, since higher frequencies occasion inductive effects in conductors which more than outweigh the advantages gained in reduced transformer cost, while with lower frequencies the increased cost of transformers is a serious objection. For arc lights, also, this frequency is very desirable, since we cannot go much lower without having an unstable arc, and since increased frequency increases the humming which is caused by all alternating arcs. At 7,200 alternations this noise is inappreciable. Besides, this frequency gives a convenient numbers of poles in motors at moderate speeds and is consequently well suited to power work, while at the same time it allows the operation of generators running at about one-half the speed of the old high frequency alternators.

For very long distance work occasionally a frequency of 33 cycles per second or 4,000 alternations per minute is used—33 cycles have been chosen in this case as being 10 per cent higher than the lowest frequency at which incandescent lighting is still perfectly feasible. In general, however, 60 cycles per second or 7,200

FIG. 1.—THE BLISS FRICTION CLUTCH PULLEY.

alternations per minute are preferred as standard frequency.

The alternating current generators have been designed with all the qualities requisite constantly in view. The reliability of the machine is increased by the care bestowed on the insulation, which renders the use of high voltages possible. The number of armature coils has been reduced, and these coils are machine wound, insulated and afterwards slipped into the armature slots; thus they are easily replacable. The generators are compounded for constant voltage under all loads, or over-compounded up to 15 per cent to take care of the drop of voltage in the line.

The bearings are both self-aligning and self-oiling, running with scarcely a tremor and exceptionally cool. Most of the machines can be arranged for direct propulsion by high pressure water wheels, the large units lending themselves readily for direct coupling to turbines. All the generators have a commercial efficiency of at least 90 per cent, rising to 95 per cent in the larger sizes.

The transformers employed in the monocyclic system are designed for frequencies between 33 and 60 cycles, and have as high an efficiency as the standard transformers. Thus they can be operated not only at the standard frequency of 60 cycles, but also in those cases where for long distance work 33 cycles have been chosen. All these transformers are oil insulated.

Sub-station transformers have also been designed for power transmission work where the transformer units may be banked in groups of large output. These are more particularly suited for step-up and step-down work, and for all sub-station distribution. They are without oil insulation, the oils being so insulated as to render their precaution unnecessary. They are thoroughly ventilated and each bank is provided with one or more ventilating blowers passing a draft of cool air through them. The efficiency of these transformers is very high, notwithstanding the decreased frequency owing to the care used in the selecting of the iron, and ranges from 96.5 to 98 per cent and even higher in very large units.

All the low frequency alternators are fitted for use as synchronous motors and will run up to speed under light loads without the use of clutches or starting motors. They have as synchronous motors the same high efficiency as the generators, will run in absolute synchronism with the generators and will stand very heavy overloads without falling out of synchronism. They also possess the valuable property of compensating for the loss of voltage by the self-induction of the line and for idle currents, by their action as condensers.

As our readers are aware, an induction motor is one with a closed circuited armature having no connections with the supply circuit. Such a motor, however, can with a simple alternating current of the old type of machine not start of itself from rest under full load without excessive current. This difficulty has been overcome in the new monocyclic motor, which in its action is essentially identical with the best three phase motors built. It has a closed circuited armature wound with a small number of heavy copper bars of low resistance, and a starting rheostat is placed within the armature spider. At starting, the coil sliding along the shaft is kept out of contact with the switch used to short circuit the resistance, but when the motor is approaching full speed, the contact ring is moved along the armature shaft, until the armature is short circuited on itself. Thus, a very large starting effort is obtained with the current limited to a reasonable amount by resistance.

In all the standard induction motors the starting resistance is adjusted so as to give a starting torque

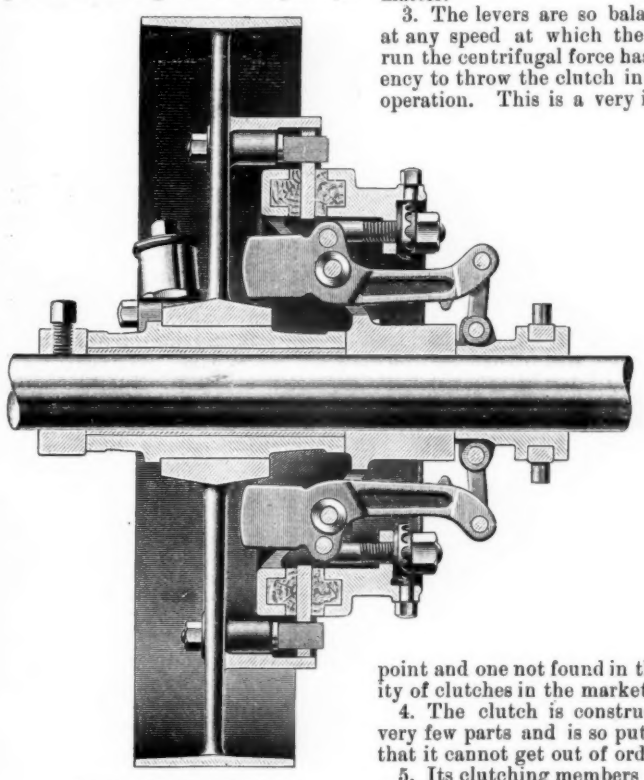

FIG. 2.—SECTIONAL VIEW.

50 per cent in excess to the running torque at full load and requiring, therefore, an excess of 50 per cent of current over full load current. By special adjustment of the starting resistances, the starting current proportionally, while a very large starting effort of 10 or more times the running torque, can be secured by a corresponding expenditure of current.

The field winding of the motor is very similar to that of the three phase induction motor, with the difference, however, that only two of the three terminals are connected with each other and with the teaser coil of the generator by the intervention of transformers.

Flexible Friction Clutch Pulleys.

The E. W. Bliss Company, of Brooklyn, state that they have been users for some time past of a large number of friction clutches, nearly every geared machine built by them being operated by one. Until recently they purchased these clutches in the open market, but became convinced that none offered for sale were as good as could be made, and determined to procure something better. Investigation has convinced them that the clutch they now offer is as near perfection as is possible for any such mechanism to attain, and they have, therefore, procured patent rights of this clutch, and having established a special plant for the manufacture of clutch pulleys offer them to the public with the confidence that they will meet with widespread approval. Some of the special features of excellence claimed for this clutch are:

1. A friction disk flexibly connected to the pulley, against the sides of which the clutch members grip. Therefore, if the pulley wears out of true on the shaft, no difference results in the operation of the clutch, no undue strains are brought on any of the parts and no adjustments are necessary to compensate for this wear.

2. There are only two clutch members, one keyed rigidly to the shaft to which the levers are attached and the other movable. This makes the adjusting of the clutch a very simple matter.

3. The levers are so balanced that at any speed at which the clutch is run the centrifugal force has no tendency to throw the clutch in or out of operation. This is a very important point and one not found in the majority of clutches in the market.

4. The clutch is constructed with very few parts and is so put together that it cannot get out of order.

5. Its clutching members are circular and concentric with the shaft, the only projecting parts being the levers, so that it not only presents a pleasing appearance when revolving on the shaft, but is in accurate balance, and may be run with safety at any reasonable speed.

6. It is very compact and occupies small space on the shaft.

7. It is constructed in the best possible manner, with all parts interchangeable.

8. They have a system of bushings for pulleys so arranged that if on account of long continued use, or where a poor quality of lubricant is used, the bore becomes worn, the bush can be returned and exchanged for one with a new lining at small expense.

President Plum's Address to the Military Telegraphers.

Herewith is printed the address of William R. Plum, president of the Society of the United States Military Telegraph Corps, delivered at the annual meeting held in Baltimore on September 12. On that occasion the old officers were re-elected as follows: William R. Plum, of Chicago, president; William B. Wilson, Philadelphia, vice-president; James E. Pettit, of Chicago, secretary and treasurer.

William B. Wilson, chairman of the Committee on Legislation, presented a full and interesting report of progress made during the last session of Congress on the bill recognizing the military telegraphers as part of the army, to the effect that the measure passed the Senate and will undoubtedly be passed by the House early in the coming session. Mr. Wilson was continued in charge of legislative matters.

One item of interest to the military telegraphers was the action of the Old Timers' Association, by which the former are relieved from the payment of dues to the latter organization.

ADDRESS BY PRESIDENT WILLIAM R. PLUM.

Comrades: It took seven years after Morse's invention to effect a practical demonstration, and nearly three times as long to make dividends certain. As a novelty, the telegraph had only ceased to attract attention when the war began.

Even Europe, as it were, then and yet in bivouac with its military, in the main, uppermost, full of war projects; Europe, which, since the invention of the telescope, had aimed to impart a military use to all new discoveries, had scarcely conceived of an army telegraph corps. Much less, then, might it be expected of the United States, which, though to some extent engaged in manufacturing, was nevertheless essentially agricultural. Indeed, our little army was then looked upon as mainly useful to fight Indians.

This lack of military spirit may account for the want of even a signal corps in our army. The ancients were as well provided as we in respect to courier service; hence, it was not to be expected with our meagre military appropriations and indifference to such matters, that we would have what no nation had aspired to, a military telegraph corps.

It has been asserted by some that the invention of lucifer matches was one of the most useful, if not the most beneficent, of improvements ever invented by man, but sometimes I have thought that powder and ball have done more than all else, by way of causing peaceful settlements of national disputes, and keeping the roads open to a higher civilization which grows apace with ever-increasing developments, and bids an ever-tending upward movement to the great goal of a common brotherhood and universal arbitration.

As epidemics compel clean cities, so the dreadful havoc of modern war powerfully influences peaceful settlements. No longer is it safe for any ruler, however absolute, to plunge his people into such a calamity, and the power itself is becoming gradually, but surely, and in many countries, like our own, one to be exercised only by the parliament of the people, in which the whole question is reasonably sure of thorough debate.

Much as we shrink from the military use of more recent explosives, who can say they may not by their very terror encourage peaceful pursuits and arbitrative justice.

The military telegraph was a potent ally of powder and ball.

The more Professor Morse thought of that child of his brain, which so links the kingdoms of the earth—which like a conquering angel is ever possessing new fields and enlisting recruits to the brotherhood of man, the more he deplored war, and, perhaps, to his mind the use of the telegraph as a factor in its prosecution was something like sacrilegious.

Army runners, the trained human voice, called the "ears of the king," trumpets, carrier pigeons, beacon fires and semaphores gave way to flag signaling, and the flag for most army purposes was succeeded by the army electric telegraph.

Up to the War of the Rebellion our military ideas were imported. We awoke in April, 1861, with a sudden start when the guns in Charleston Harbor declared war. Rumors there had been. The occasion was years in debate. Argument had ceased. It was a case of powder, ball and electricity. Then we began to cultivate and export military ideas, and Europe sent her experts here to learn, from an agricultural people, lessons in the art of war, not the least of which was a new *corps du armee*, of which you were a part.

It is said that no useful invention is perfected on its introduction; that even in God's plan, ultimate perfection is only reached through the evolution of untold centuries. We grope so much in the dark that ofttimes we begin at the wrong end. One is curious to know how much interested stockholders were consulted in the organization and development of the military telegraph on a civil basis, which enabled telegraph companies operating in the border States to make fortunes which otherwise might have paid the entire cost of the corps.

There certainly is force in the statement that as the war was believed to be of only about three months duration, the necessity for a strictly army organization was not felt, but this illusion was soon dispelled. Perhaps Edwin M. Stanton, the able and conscientious Secretary of War, when the operators in 1863 petitioned to be placed on an army footing the same as the Signal Corps had recently been, was really of the opinion assigned to him that the telegraph corps was more efficient because not subject to the commands of military officers — a reason which in its fullest force would have applied to the Signal Corps, but we do know, and the Secretary must have known, that in practice the army officers did exercise substantially the same power of command over the one as the other.

The military telegrapher was the sole possessor, and he only understood the workings of the cipher keys by which a large proportion of the six and one-half million messages were sent. The signal office officer alone knew the signal code—the one could have been kept as inviolate as the other under similar organizations. The signal officers received their orders from the chief signalist of the department they were in—so the telegrapher received his from his chiefs, who alone of our corps were commissioned.

If there was not an unsuspected dividend paying power which feared the temptation of a commission to operators in the North, there was some unknown reason or influence mflitating against us, for about this time Secretary Stanton, our devoted friend, reported to the President that "in diligence, fidelity and important aid they have been unsurpassed by any *branch* of the service." "The military telegraph has been of inestimable value to the service, and no corps has surpassed, few have equaled, the telegraph operators in diligence and devotion to their duties."

Notwithstanding the fact that Quartermaster General Meigs officially reported that "night and day they are at their posts. Their duties constantly place them in exposed positions, and they are favorite objects of rebel surprise. It is much to be desired that some mode of recognizing and rewarding the bold, faithful and most important services of these gentlemen should be provided." I say, notwithstanding this recommendation and those of the War Secretary, when no longer needed to brave the bullets of the enemy, to share with other soldiers a soldier's lot in death, wounds, imprisonment and disease, the Military Telegraph Corps was disbanded like a lot of hirelings without so much as a congratulatory address from anyone.

Thank Heaven it requires more insensibility than I possess to consider this dismissal and nearly thirty years of congressional silence, with calmness.

I have sought history in vain for its counterpart, and with reason believe, much as I would avoid allusion to my own efforts, that but for our printed history no tongue or pen would have embalmed our corps' heroics, or have given this thinning body any detailed evidence of its military career.

It is true General Sherman wrote that we "were as much a part of the army as though armed with muskets in the ranks;" that by special orders of, particularly, Generals Thomas and McPherson, we wore officers' uniforms; true, General Grant wrote that our service was as necessary to Federal success as the railroad is to commerce, and that nothing could be more complete than this body of brave and intelligent men; true that Generals Sheridan, McClellan, Burnside, Schofield, Hawley, Franklin, Logan, Banks, Warren, Rosecrans, Hooker, Sanborn, Haupte, Hayes, Warner, Veazey and others, have gladly borne testimony that produced not less than eight favorable reports on our bills by as many congressional committees on military affairs; that once in the House, and once in the Senate, our bills have been voted, nevertheless we have need yet to persevere in our efforts.

Near the close of the last session of Congress the following bill was reported by the Senate committee for passage, viz.: Be it enacted, etc., that the Secretary of War is hereby authorized and directed to prepare a roll of all persons who served in the operation of military telegraph lines during the late Civil War, and to issue to each, upon application, unless it appears that his service was not creditably performed, or to the representatives of those who are dead, suitable certificates of honorable service in the Military Telegraph Corps of the Army of the United States, stating the service rendered, the length of such service and the dates, as near as may be, between which such service was performed; provided, this law shall not be construed to entitle the persons herein mentioned to any pay, pension, bounty or right not herein specifically provided for.

The report accompanying bill reads as follows:

The Committee on Military Affairs, to whom was referred the bill (S. 1009) for the relief of telegraph operators during the War of the Rebellion, have examined the same and report:

The subject matter of this bill has been before Congress for several years. It has been the avowed policy of the government not to recognize as a part of the army those persons who filled civilian positions.

In places of that character no stipulated term of service was agreed upon, and at any time it was optional with the persons interested whether they should continue to serve the government or not. They were not subjected to military discipline, and ordinarily they were not put in places of danger to life and limb. And, furthermore, they were usually paid more for corresponding grades as a compensation for the absence of the right to pension, etc. But the case of the telegraph operators is somewhat different. Their services were important and valuable. Wherever headquarters were established the telegraph operators were always stationed. The construction of the telegraph lines often involved danger, and the committee is of the opinion that a slight departure from the policy of the government in not recognizing civilian employés of the army is justified in this case.

The bill in its amended form meets with the approval of the commanding general of the army, and was recommended by this committee in the Fifty-first Congress. It simply provides that a certificate of service shall be given, and particularly provides that no pay or allowances shall be available to the persons covered by the bill. The accompanying letter is made a part of the report.

The committee recommend the passage of the bill as amended.

Strike out all after the enacting clause and insert:

(Here follows the above bill.)

HEADQUARTERS ARMY OF THE UNITED STATES,
WASHINGTON, D. C., February 11, 1890.

DEAR GEN. HAWLEY: Referring to Senate bill 1,000, "For the relief of telegraph operators during the war," there is no question, in my judgment, that the persons engaged in the military telegraph service during the late war deserve recognition for the bravery, fidelity and skill with which they discharged their duties, and that they should at least receive a certificate of recognition and honorable discharge from the service. But it does not seem to me that "all persons engaged in the operation and construction of military telegraph lines" would be fairly entitled to the assimilated rank of "commissioned" officers. Some of them would doubtless be entitled to such rank, and a few of them to rank above the lowest commisioned grade. But the majority of operators would probably rank as sergeants, while many who were engaged only in the "construction of military telegraph lines" might only be entitled to rank as privates.

The monthly pay would hardly be a just guide by which to determine the assimilated rank, for the reason, among others, that much higher pay is often expected by and given to civilians in the military service for the very reason that they have not the privileges and rewards which attach to military rank. There would, I think, be no objection to naming the assimilated rank in the certificate of discharge if it could be fairly ascertained. But, in view of the difficulty which must be encountered in any attempt to do this at this late day, it would probably be better for the members of the military telegraph department to be content with a certificate of honorable discharge, in which should be mentioned the grade of the service in which each was employed. The War Department could readily prepare a form of certificate which would contain all that can reasonably be desired without attempting to determine relative rank.

Yours very truly,
J. M. SCHOFIELD,
Major-General.

HON. JOSEPH R. HAWLEY,
Chairman Committee on Military Affairs, U.S. Senate.

On August 17 the Senate passed this bill unanimously, but there was no opportunity for the House to act upon it, though we have every assurance that it will be passed in December next.

I have given the expressions of this bill much thought. Some have conceived it to be even more favorable than the one we presented.

The great point of our contention, a *sine qua non*, seems to be covered, viz., we are declared to have been a part of the army.

That such was the intention is most clearly evidenced by the report of the committee. The Secretary of War is directed to issue to us a certificate of "honorable service in the military telegraph corps of the army." That certificate must fix the period and character of the service; what more is there in an "honorable discharge?" After all, is it not more consistent with a condition nearly 30 years after our discharge? In

fact I am of opinion that the Grand Army of the Republic, which, with 410,000 members, by solemn resolution declared that we were a part of that army and Congress should so recognize us, will not hesitate to rule that the act and certificate entitles us to membership.

If I am correct, our duty is clear. We should support this bill in the House with enthusiasm and our whole strength.

Too much credit for the past year's work cannot be given to the chairman of your Committee on Congressional Action, Comrade Wilson, to Comrade Dealy, a member and secretary of the committee, and to Mr. Pettit, your secretary and treasurer, for they have been zealous and untiring in their efforts, doing more work than you have any idea of.

Let us hope that at our next reunion we will congratulate one another and wear the button of the Grand Army of the Republic.

And why not?

Do not the list of casualties and captures in our little corps, probably aggregating 322, establish a military status? Do not the telegrams supplying, reinforcing and moving the armies manifest a courier service unequaled in any war, ancient or modern? Do not the 15,389 miles of military telegraph lines constructed and operated in the theaters of the war, hundreds of them within range of the enemy's guns and often under fire, evidence a devotion and bravery that make us worthy of the comradeship of others of the army? And did not the sole custodianship of the cipher keys import a confidence in the corps never before nor since reposed in so large a body of men, a confidence that was never betrayed?

Comrades! Our numbers are growing smaller and smaller. Each year breaks the circuit somewhere. There are more of us gone than remain. A few years and personal identity will be merged into general history. Some will have their names there—all will leave their influence there, and years may come and years may go, but that influence, like a silent messenger from heaven, will incite to patriotic fidelity and devotion as long as governments continue.

The recognition will come, but there is within us that proud satisfaction of having done our whole duty in a great crisis, which no congress of man can give or take away; a heritage, which executions cannot reach nor panics spoil, for your children who will yet see your names upon the army roll.

To those of you who are here, to those of us who could not attend, I appeal, as I have in the past, to hold up the hands of your Committee on Congressional Action; to be steadfast and immovable in your purpose, abating not a jot or tittle in your zeal to press our claim for recognition by Congress co-extensive with that splendid recognition already awarded us by the Grand Army of the Republic, the Army of the Tennessee in annual encampment assembled, by the Legislature of the State of Ohio, and many a great commander living and dead.

At a meeting of the council of the village of Highland Park, Mich., held last week, a resolution was passed annulling the franchise granted to the Highland Park Electric Railway Company, under which they operate or did operate the line on Woodward avenue from the city limits north to the Log Cabin Farm. This was done because for about three months—in fact, ever since Woodward avenue was torn up to pave—the company has run no cars on that end of the line at all. The village clerk was instructed to formally notify the new owners of the action.

PLANT OF THE CONSOLIDATED STREET RAILWAY COMPANY, OF ATLANTA, GA.

AN INTERESTING PLACE FOR CONVENTION DELEGATES TO VISIT.

In view of the approaching convention of the American Street Railway Association at Atlanta, Ga., beginning October 17, the following particulars of an interesting street railway plant in that city may not come amiss:

The Consolidated Street Railway Company, of Atlanta, Ga., are making considerable improvements and additions to their power plant. Up to three months ago the plant consisted of three return tubular Bigelow boilers, 72 inches by 16 feet, with 96 four-inch tubes, these three boilers being connected to a 48-inch iron stack 90 feet high.

In the power house were two Cooper-Corliss high-pressure engines, with cylinders 20 inches by 42 inches, running at 88 revolutions per minute. These engines were belted, one to each end of a 40-foot counter-shaft. Each receiving pulley was provided with a friction clutch, so that each engine could be stopped independently of the other. Driven from this counter-shaft was seven D 62 Thomson-Houston railway generators.

The boiler and engine room combined is 50 feet by 100 feet. The generators and shafting occupy almost the entire available space.

About two months ago the Consolidated company received one 300 kilowatt belted generator. This generator was installed just beyond the counter-shaft, and in line with the receiving pulley on the shaft. It was wired up to a temporary switchboard and everything was made ready, so that after shutting down time at night the main belt was removed from the counter-shaft and extended over the pulley of the new generator. This required the belt to be lengthened about 14 feet. For the next six weeks this new generator and three old ones carried the load. During this time a second 300 kilowatt Westinghouse machine was being installed beyond the shaft, and in line with the other engine, the belt being moved from one pulley to the other, as in the first case. Since that time the two 300 kilowatt machines have been carrying the load. All the counter-shafting and old machines have been removed and foundations put in for one 500 kilowatt direct-coupled outfit.

The foundation is of concrete, 50 feet long, 30 feet wide and 13 feet deep. The proportions are one of Portland cement and two of Louisville cement to four parts of granite rock and broken brick. The foundation is covered with 12-inch cap stones. The complete foundation weighs about 750 tons.

The new engine which is being installed is a tandem compound condensing Corliss engine. It was designed and built according to specifications of the chief engineer, Thos. Elliott, of the Consolidated company. This engine is of very massive and unusually heavy proportions, and no doubt will give a good account of itself in the future. The cylinders are 22 inches by 40 inches by 48 inches; the steam and exhaust valves of both cylinders are double ported. Besides giving larger port area, this reduces the travel of the valve gear.

The bed plate is of the box girder type, and has a continuous bearing on the foundation, from the cylinder out beyond the main shaft. The guide section of the bed plate is cast separate from the other half and bolted together. The bed plate weighs 55,000 pounds. The main shaft is of hammered select scrap iron, is 20 feet four inches long, 21 inches diameter in the center and 19 inches in the bearings. The bearings are 36 inches long, and fitted with quarter boxes and cast steel adjustable wedges, which are the full length of the bearings. The lower box is also adjustable by cast steel wedges. The out-board bearing is a duplicate of the main bearing, if it was separated from the bed plate. It is provided with adjustable wedges in the same manner as the main bearing. This adjustment allows the armature to be kept in the center of the pole pieces, which is an important item.

The fly wheel is 18 inches in diameter with the rim section 19x20 inches. The wheel is made in eight segments, one hollow spoke being cast with each segment. The wheel centers which were pressed on the shaft at 300 tons are 84 inches in diameter. The ends of each spoke are secured in the center by three three-inch bolts. The rim sections are held together by one two and one-half-inch bolt, passing through inwardly projecting flanges, and two wrought iron links three by three inches and 24 inches long. This link is shrunk into grooves cast in the face of each segment. The wheel is turned on the outside and is a massive piece of work. This design has been used extensively in rolling mill practice and has demonstrated that a wheel put together in this manner will stay together under the most trying circumstances. The wheel complete weighs a little over 50 tons.

The crank is 72 inches in diameter, 12 inches long and properly balanced. It weighs 11,000 pounds, is of cast steel and was pressed on at 225 tons. The crank pin is 9x10½ inches and the cross head pin 9x9 inches. The cross head is cast steel, 33 inches in diameter, with babbited shoes 18x28. The shoes are adjusted by tapered wedges which have a bearing the full length of the cross head, the guides being round, of course. The piston rod from the low pressure is five and seven-eighths inches, fitted with metallic packing and keyed into the cross head. The cylinders are secured together by two heavy cast steel side arms. The engine is provided with an automatic stop, which is controlled by a pulley riding on the governor bolt.

This engine is probably the heaviest in use for the same horsepower, and although everything is so massive the appearance is elegant, and shows what skillful designing and first-class workmanship can accomplish. It certainly is a credit to the designer and will prove very interesting to the delegates to the street railway convention. The engine is directly connected to a 500-kilowatt Westinghouse .0 pole generator, to run 90 turns per minute.

A 12x16x24 inch duplex Smith-Vaile condenser is used, drawing water from a 55-foot brick pool. From the condenser the water goes to the top of the cooler, 20 feet high; here the water is cooled by four six-foot fans, after which it passes back to the pool and is used continuously.

There has also been installed one 250 horse-power vertical boiler. This is connected to a 42-inch by 90-foot stack by a breeching at an angle of 45 degrees. This boiler is 15 feet between the tube sheets and has 284 two and one-half-inch tubes. The fire box is 84 inches in diameter, 48 inches high, the shell being 72 inches in diameter inside. The outside sheets are nine-sixteenths of an inch. Joints are butted and strapped, both inside and out. All rivets are one inch in diameter, machine riveted. It was designed for 150 pounds working pressure, and is an excellent piece of boiler building.

All the generators are over compounded 10 per cent. This maintains steady voltage on the line, and is considered a very good feature by the Consolidated people. The switchboard is very handsome. It is of white marble, brass trimmings, with Westinghouse instruments, the new style double pole circuit-breaker being used. The Wurts non-arcing and tank lightning arresters are in use.

Extensions of Telephone Lines.

The Southwestern Telegraph and Telephone Company is rapidly proceeding with its work of connecting all the larger cities of Texas by wire and affording a telephone system which will at once be extensive and comprehensive.

The new telephone line in course of construction by the Central New York Telephone Company between Utica and Lowville, N. Y., is completed between the former place and East Martinsburg, and the present week will be completed to Lowville.

At the annual meeting of the directors of the Northwestern Telephone Company business relating to the Minnesota branch of the telephone company was discussed and the way paved for certain improvements. In the annual election of officers, Levi Sprague, of Lowell, Mass., was chosen president, and C. J. Glidden, also of Lowell, was re-elected secretary and treasurer.

The Delaware and Atlantic Telegraph and Telephone Company, which controls the Bell telephone system in South Jersey, will expend $10,000 in improving its lines and service in that portion of the State. The principal improvement will be the substitution of metallic lines from Philadelphia to Millville and Bridgeton, N. J., in place of the main wires now running from Philadelphia to the two cities.

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All aboard for Atlanta, Georgia.

Next week's issue of the ELECTRICAL REVIEW will particularly interest street railway men. So does the REVIEW every week. The thousands of them that read it prove this.

We rise to ask, Where does the next convention of the National Electric Light Association convene? Has the Executive Committee taken to the woods?

We will have rapid transit in this city when the commission is given to a committee of engineers and practical men. Electrical engineers should be included. Politicians are not the men for this great work.

An English medical journal reports an essay on the comparative sensitiveness of the skin and taste in men and women in different classes of life. The author finds that the sensitiveness to temperature and to electrical currents and of taste is greater in women than in men, both among educated and uneducated people. Among educated men all forms of sensation are better developed than in the uneducated; in the case of women, however, education seems to make but little difference in the sensation, though pain is felt from the induced electrical current sooner by uneducated than by educated women.

Our recent expression of regard for an old and esteemed subscriber seems to have had a salutary effect. We felicitate His Majesty Somdetch Phra Paramindr, Maha Chulalongkorn, Supreme King of Siam, on his convalescence from a serious illness. His majesty, at the time of our last advices, was able to take walking exercise in his apartments. May the King of the Morning Dawn, the Ruler of the Land of the Royal Peacock Feather and the Imperial Potentate of the Realm of the Sacred White Elephant, experience rapid recovery to health and power, is the sentiment of the ELECTRICAL REVIEW—the price of which is but 25 yens per year. Again we vociferate, *Vive le roi Chulalongkorn!*

We are glad to give space for President Bracken's interesting letter on storage battery work. We are glad there is spirit enough left in that quarter to reply to the ELECTRICAL REVIEW's criticism. Although the communication is chiefly reminiscent—a "looking backward" recital—it shows that there are still a few cells sold to consumers by this company each year. We hope in time their work will be extended, and that they may yet have the courage to install central stations on a scale similar to the Chloride company and the Edison company in New York city. We wish you well, President Bracken, and hope to see a return of the energy ably and progressively put forth by the Julien Electric Company when you were at its head in this country.

A STORAGE BATTERY HIGHLY HONORED.

The report on the Chloride accumulator of the Committee on Science and the Arts of the Franklin Institute appears in full in the ELECTRICAL REVIEW this week. This examination and report was made by the Institute in the interest of this branch of science and is a matter of considerable moment. The findings of the committee are highly complimentary to this battery, and will give it particular strength before the industrial world, where faith in the storage battery is still extant. The ELECTRICAL REVIEW congratulates the progressive and public-spirited owners of the Chloride battery on this unprejudiced and carefully-considered proof of its merits.

DO YOU HEAR, STEAM ROADS?

An electric railway to unite Baltimore and Washington is under way, and the latest ambitious scheme of this sort is a trolley line from Pittsburgh to Chicago. Some of these days the steam roads will awaken to the situation, and then when the competition has nearly wrecked them they will attempt to fight it.—*Philadelphia Item.*

We don't wish to kill any enthusiasm, but we'll wager a year's subscription that the Pittsburgh-Chicago scheme is not scaring the "steam roads."

WHAT'S THIS! WON'T OUR PATENT OFFICE PERMIT FLYING MACHINES?

[*From London Engineering.*]

To the editor of *Engineering:* In your issue of the 14th instant I notice a letter *re* "The Problem of Flight," signed R. Runeberg. Mr. Runeberg, like a great many others who write letters in newspapers, has written his letter without understanding in the least the subject of the controversy. The United States Patent Office has refused a patent on a flying machine not because it is not new, as Mr. Runeberg supposes, but because it is a flying machine. It is quite true that I use an engine, screws and aëroplane, but there are a great many features connected with the machine each clearly patentable. The United States Patent Office would probably grant me 20 different patents on this machine on the improvements which it was necessary to make in engines, boilers, machinery, aëroplanes, condensers, regulators, etc., in order to make a machine which would actually fly. Should I take out 20 patents on these different devices and not mention a flying machine, I should get my patents, but then they would not give me much protection, and, moreover, they would cost me at least $2,000.

I claim that the Patent Office ought to be wide and comprehensive enough to grant a patent on the machine as a whole, and not insist on its being patented in detail. It will be remembered that one of the reasons given for rejecting the patent was because it was not provided with a gas bag, which, to my mind, is absolutely ridiculous.

Yours truly,
HIRAM S. MAXIM.

Baldwyn's Park, Bexley, Kent, September 17, 1894.

ELECTRIC RAILWAY.

NEWS OF INTEREST TO THIS GREAT INDUSTRY FROM ALL PARTS OF THE UNITED STATES.

Trolley cars are giving great satisfaction to passengers on Fifth and Sixth streets, Philadelphia.

Front and wheel guard fenders have been ordered on all Baltimore electric cars within three months.

The leading officials of many of the electric street railways are planning to attend the Atlanta convention next week.

The Middletown, Conn., street railway is to be equipped with the trolley. J. A. Kelsey, of New Haven, and A. C. Pond, of Boston, own it.

The scheme is revived to build an electric line from Marion, Ind., to Indianapolis. Joshua Strange, of Marion, is acquainted with the scheme —in fact, is no stranger to it.

The Arsenal street car line in St. Louis is to adopt electric power. Mr. Chas. Green is the president of the company, but he is evidently not so green but that he knows a good thing.

An electric railway is to be built from Mercer, Cal., to Yosemite, a distance of 70 miles, by G. A. Walkup, of Chicago. Several hundred workmen will be wanted, as it is the intention to complete the road as rapidly as possible.

At Sherman, Texas, the College Park Electric Belt Line and its two additions passed into the hands of a Houston and Boston syndicate. The consideration was $50,000. The new company will build 10 miles of additional road.

A deed was filed for record in Baltimore county last week granting a right of way over the Reisterstown turnpike for an electric railway to the Pikesville, Reisterstown and Emory Grove Electric Railway Company in consideration of $13,500.

The Weymouth, Mass., Board of Selectmen held a special meeting last week and voted to grant a franchise and location to the Braintree and Weymouth Street Railway. Work may be begun on the road within two weeks, and the cars may run by November 15. The capital stock of the company is $40,000, all of which has been subscribed.

A unique trolley car fender is proposed by a Boston inventor. He has taken the large revolving brushes from a street sweeper and placed them in such a position under the car so that a person who happens to fall in front of the car will be swept from the track—a much better arrangement than sweeping up the remains from the track after an accident.

J. C. Shafer, president of the Asbury Park Electric Railway, New Jersey, is backing the scheme of a trolley road to connect the Park with Branchport. With the opening of the line Asbury Park will have an important connection by steamers for freight and passengers to and from New York. Passengers will be carried from Asbury Park to New York and return for $1.

An associated press dispatch from Atlanta says: Elaborate arrangements are being made by the Citizens' Committee for the entertainment of the delegates to the thirteenth annual convention of the American Street Railway Association, and which will open two weeks hence in Machinery Hall of the Piedmont Exposition. The occasion will be noteworthy from the fact that Atlanta is the furthest south that the association has gone to hold its sessions. The last convention was held at Milwaukee. Hon. Henry C. Payne, of that city, will preside over the coming gathering. Among the papers to be read is one by Russell B. Harrison, president of the Terre Haute electric railway.

The Easton *Free Press* has been looking into the advantages of trolley roads in some of the Pennsylvania towns, and thus reports upon Hazleton:

"The benefits of electric roads are strongly illustrated in the instance of Hazleton. That city is rapidly building up in its suburbs, and the trolley lines are among the main causes. Hazleton is the center of a great mining district and the trolley roads lead in all directions. They ramify through Hazleton and the surrounding territory in a way that brings the places into close connections, and especially benefits the city. Property is advancing in value, the population is increasing and Hazleton is taking on increased importance. Few cities in this State have changed so much for the better in the last few years as Hazleton."

The Nassau Electric Company, of Brooklyn, has been informed by City Works Commissioner White that the permit to build on Marcy avenue would be revoked permanently if within a reasonable time a sufficient amount of property owners' consents were not provided. The railroad company made an error, it is said, securing consents by leaving out of the estimate entirely the property which is exempt from taxation. They claimed that property which paid no tax had no right to object to or permit a railroad to be built. Very nearly the amount needed to secure the legal right has been obtained and one of the officials of the company said that everything would be all right in a short time.

W. A. H. Bogardus, general manager of the Brooklyn Heights Railway, which controls the principal trolley lines in Brooklyn, including all the branches of the Brooklyn City Railway Company, has resigned his place, declaring that failing health was the reason. Cyrus P. Smith, the secretary and treasurer, also resigned. Mr. Bogardus takes Mr. Smith's place. One of the directors of the road said that there had been a reduction in the salaries of all the employees, with the exception of the motormen and conductors, from the president down. The reductions, with other retrenchments recently made, would effect an annual saving of about $200,000. The directors announce that they have agreed to cut down the fee for attendance on meetings one-half. Mr. Seth L. Keeney is talked of as general manager—a good man.

ALL ABOARD FOR ATLANTA.

(*Continued from first page.*)

manager; Nashville Street Railway Co.

New Haven., Conn.—Geo. A. W. Dodge, secretary New Haven Street Railway Co. Israel A. Kelsey, manager; Albert E. Pond, superintendent; Minchester Avenue Railway Co.

New York, N. Y.—E. T. Landon, secretary Dry Dock, Eastern District & Broadway Railroad Co.

Norwalk, Conn. — W. F. Acton, secretary Norwalk Street Railway Co.

Omaha, Neb.—W. A. Smith, general manager Omaha Street Railway Co. W. S. Dimmock, general superintendent Omaha & Council Bluffs Railroad & Bridge Co.

Paterson, N. J.—W. R. McAdoo, manager; Wm. Brock, director; Paterson Railway Co.

Pittsburgh, Pa.—John G. Holmes, president; J. E. Rugg, general superintendent; Citizens' Traction Co. B. F. Greenwood, general manager Pittsburgh, A. & M. Traction Co. Wm. L. Elkins, general manager; J. G. Traggardh, treasurer; Pittsburgh Traction Co.

Quincy, Ill. — E. K. Stone, Jr., secretary Quincy Horse Railway Co.

Racine, Wis.—Jackson I. Case, president; Allen Sherman, secretary; Belle City Street Railway Co.

St. Louis, Mo.—Chas. Green, president People's Railway Co. D. G. Hamilton, president; Robert McCulloch, vice-president; Richard McCulloch, civil and electrical engineer; St. Louis Railroad Co. Joe S. Minary, secretary Southern Electric Railway Co.

Tampa, Fla.—E. S. Douglass, president Consumers' Electric Light & Street Railway Co.

Toledo, Ohio.—Winfield S. Jewell, general manager Toledo Consolidated Street Railway Co.

Trenton, N. J.—Lewis Perrine, Jr., president; P. E. Hurley, superintendent; J. H. Blackwell, director; R. S. Woodruff, counsel; Trenton Passenger Railway Co.

Vincennes, Ind.—E. F. Tindolph, secretary; Wm. C. Mason, director; Vincennes Citizens' Electric Railway Co.

Washington, D. C.—R. F. Baker, president; O. C. Green, director; Columbia Railway Co.

Waterbury, Conn.—A. O. Shepardson, general manager; E. A. Bradley, superintendent; Waterbury Traction Co.

Webb City, Mo.—E. J. Pratt, electrician Southwestern Missouri Electric Railway Co.

Wilkesbarre, Pa.—John Graham, general manager; J. C. Mixell, superintendent; James Fagan, electrician; Wilkesbarre & W. V. Traction Co.

Williamsport, Pa.—William Emery and Ernest H. Davis, directors Williamsport Passenger Railway Co.

Youngstown, Ohio.—A. A. Anderson, manager; S. F. Hazebrigg, superintendent; Youngstown Street Railway Co.

Anniston, Ala.—Howard W. Saxton, president Oxford Lake Railway Co.

Chicago, Ill.—F. L. Freemen, assistant superintendent West Chicago Street Railway Co.

Pittsburgh, Pa.—John Bright, South Pittsburgh Street Railway Co.

Rockland, Me.—Geo. E. Macomber, president Rockland Street Railway Co.

Additional Exhibitors.

The following list of exhibitors is in addition to those published in the ELECTRICAL REVIEW September 26:

Claude Estes, Macon, Ga.
National Lock Washer Company.
American Railway Maintenance Syndicate.
Chas. L. Cornell, Hamilton, O.
T. J. Thomas, Knoxville, Tenn.
J. W. Nagle, Philadelphia.
Stilwell-Bierce and Smith & Vaile Company, Dayton, O.
Young Lock Nut Company.
A. Haas and R. E. Watson, Atlanta.
New England Engineering Company, Waterbury, Conn.

PERSONAL.

Col. J. N. Partridge, president of the very successful DeKalb road in Brooklyn, is mentioned as the probable next president of the American Street Railway Association. No wiser or more acceptable choice could be made. The Colonel leaves New York for Atlanta on the 4:30 special Monday, October 15.

Chairman N. W. L. Brown, of the Exhibits Committee, has been untiring in his efforts to satisfy exhibitors at the Atlanta Street Railway Convention. The task has been an exacting one, for the enterprising representatives all wanted to be in the front row. Still, Mr. Brown has been able to please nearly everyone.

Mr. W. J. Morrison has resigned from the Fort Wayne Electric Corporation to enter other business. Mr. Morrison is one of the best known electric light missionaries in the country, and has closed up a great many large and important contracts. His friends will, one and all, extend best wishes for his success in his new field.

Mr. E. E. Downs, well-known general manager of the Street Railway Company of Kalamazoo has resigned his position and goes to Battle Creek, Mich., to take charge of the new street railway which is to be constructed in that city. Mr. Downs was for several years with the General Electric Company and had charge of the building of some of their important roads.

Mr. A. N. Mansfield, S. B., of the Young Men's Institute of Technology, now in the engineer's department of the American Telephone and Telegraph Company, will be the instructor in the electricity class at the Young Men's Institute of the Young Men's Christian Association, 222 Bowery, New York. Mr. Mansfield will endeavor to make the course of lectures meet the needs of young men engaged in various branches of electrical work. The class began October 2 and continues to May, 1895.

Mr. S. E. Barton, formerly of Boston, now of the State of Washington, was thrown from a horse recently and had his hip dislocated. The Port Angeles *Times* says: "Drs. Lewis and Lull spent the entire evening in endeavoring to place Mr. Barton under the influence of an opiate, and it was only after a second attempt that they succeeded. A dislocation of the hip, even under ordinary circumstances, is a difficult injury to deal with, but as Mr. Barton resisted the effects of opiates, his muscles would not relax and the united strength of two powerful men was not sufficient to draw the bone into place. Later, however, he was thoroughly under the influence of the drug, and the bone was slipped into place without any difficulty. The patient is doing well under the circumstances, but will be confined to his bed for some time yet."

THE ELECTRIC BRAKE IN PRACTICE.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK AND CHICAGO, SEPTEMBER 19, 1894, BY ELMER A. SPERRY.

(*Continued from page 165.*)

In developing this system, the point which seemed fraught with the most difficulty, and which has finally received the simplest solution of any in connection with the problem, was that of obtaining always and with absolute certainty sufficient current at the lowest speeds without the aid of the trolley current. Teaser coils were at intervals resorted to, maintaining connection with the trolley circuit. "Artificial teasers" were also used, being a device by means of which the trolley circuit was entirely done away with, and which worked well. Observations made from time to time in connection with these experiments led to an exhaustive investigation of residual magnetism, in consequence of which structural means were adopted to utilize to the full the residual magnetism of the motor. This supply is constantly being renewed with every energizing of the car. This method was found to be the simplest as well as the most effective. The connections, and in fact the whole arrangement of the electric brake upon the car, are extremely simple. This is shown by the fact that only one small extra wire needs to be run to the controller in addition to the ordinary wiring of the standard equipment without the electric brake. The certainty of operation is evinced by the fact that at present writing over 150 of the equipments have been placed, which are making upwards of 10,000 miles daily in regular service. Early in the experimentation a phenomenon was observed in reference to the persistence of the current even after the motor had stopped. This is due to the slow action of the decreasing magnetization, taken together with the reaction or self-induction effect of the fields and any brake coil or coils that may be in the circuit. The movement of the magnetic lines, which persist after, and in fact long after, the motion of the motor has ceased, generates potential. In many instances it is possible to draw an arc from the rupture of the brake circuit one second after the motion has ceased, showing the presence of current in the local circuit. Fig. 5 has been developed from the average stop to show the curve of current in reference to the motion, the black line indicating the period of motion during the application of the brake, and the curve indicating the current intensity and its duration. The current flowing after motion ceases, though small, is found exceedingly useful in holding the car from starting itself, even on quite a heavy grade, as only a small quantity of energy added to the already great friction of quiescence will prevent the car from starting. This persistency of current is also found useful to kill or destroy the magnetism of the brake magnet, in case it is desired to suddenly move the car forward again. The tendency on the part of the windings at the moment of rupture to generate an opposing electro-motive force tends to suddenly free the magnet from its face, a purely accidental feature which is of great value and utility in this connection. The wonderful energy of the withdrawal of the lines of force, being in its manifestations a phenomenon of magnetic viscosity, is illustrated by the following fact: With a perfectly dry track, a great force is required to shear the adhesion and start the wheels slipping. A car going down a grade under these conditions, where no brake magnets are present, will, with a sudden application of the electric brake, generate sufficient current to not only arrest the motion of the wheels, but start them going in the opposite direction, the reverse motion being maintained through an interval truly remarkable, in some instances running as high as one and one-half seconds. It will be borne in mind that all the above phenomena are entirely independent of the central station current, the trolley connection having been severed before the brake is applied.

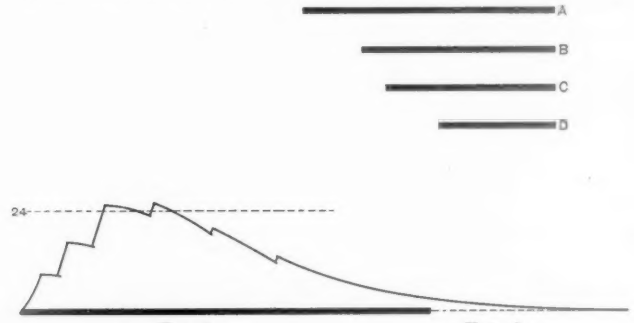

FIG. 5. FIG. 6.

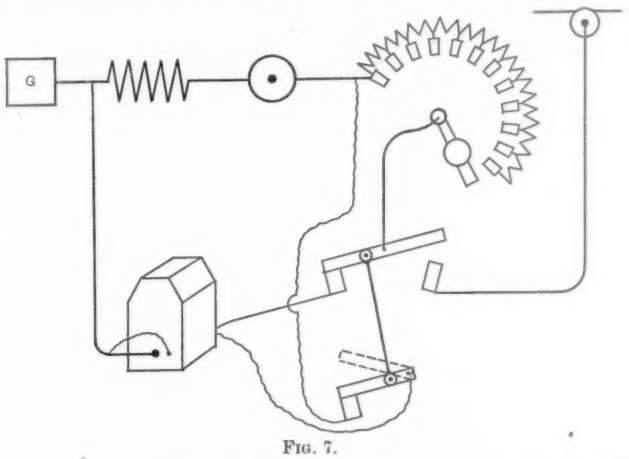

FIG. 7.

The current required to be developed to stop a car when no other braking apparatus is used, is found to be only a fraction of that required to accelerate the car in the same interval. This may be easily illustrated by the lines in diagram Fig. 6, A being the electrical energy applied in a given acceleration; B the resulting mechanical energy stored in the car after deducting all the wastes in the motor, and between the motor and the momentum; C the average mechanical energy in the car at the time of applying the brake; D being the electrical energy required to be developed for retardation after the efficiency losses have all been provided for out of the quantity C. Thus, it will be seen that the so-called efficiency losses act in a two-fold sense, between A and B and between C and D, to reduce the amount of current required to be generated for braking purposes.

As to the effect of the electric brake on the total temperature of the motor the following experiments were made. A car and trailer were operated over the line in regular service 41.1 miles without the brake. The temperature of the atmosphere was noted every half hour during the test, and the temperature carefully taken of all parts of the motor at the end of the run. The succeeding day a similar run was made with the same trailer over the same track and in the same length of time, but with the electric brake in use, braking direct on the simple local circuit without brake magnets. The difference in the average atmospheric temperatures during the two days was six and one-half degrees, and the difference in the average temperature of the motor parts was seven degrees, making only a difference of one-half of one degree Centigrade as the total increase of temperature from the use of the brake. Observations in reference to the heat in the rheostat were made, although no temperatures were taken, and no difference could be observed in reference to the heating of this portion of the equipment. The explanation will be found in the comparatively small amount of current as seen above, and the relative infrequency of its application and short duration at the time of each application. The following wattmeter readings have also been taken:

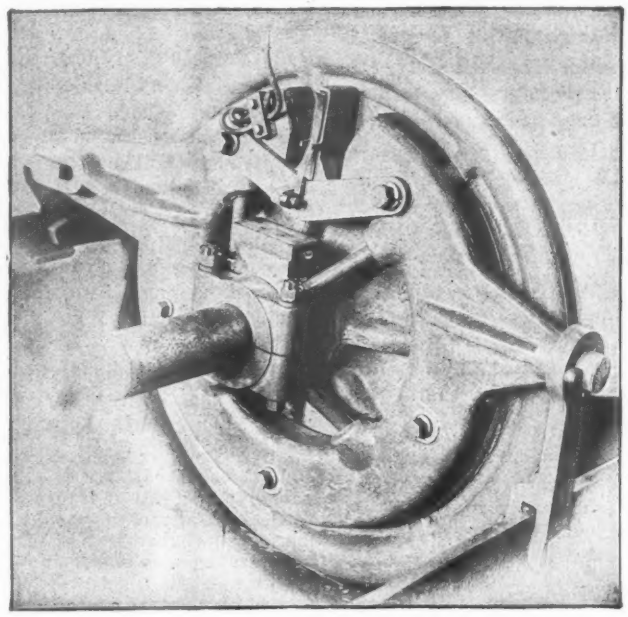

FIG. 8.

	First Trip.	Second Trip Trailer.
Reading of wattmeter, leaving Lake View	392,538.9	392,542.25
Reading of wattmeter, end of round trip	392,542.25	392,547.1
Number of full stops	55	53
Number of slow-ups	42	37
Time	1:40	1:35
Difference in reading	3.35	4.85

Constant of wattmeter equals "22"; total watts both trips, 180.4.

Diagram No. 7 indicates the connection of the wattmeter in the circuit.

Automatic resistances were even at one time used in the endeavor to relieve the motorman of all responsibility in connection with the control in applying the brake, but superlative simplicity was found to be much more desirable than the superlatively automatic, and the automatic devices were seen to be entirely unnecessary, the apparatus as at present constructed being of great simplicity.

The diagram of the braking current in Fig. 5 shows the automatic decrease in the intensity of the brake application so desirable with the decreasing speed referred to above. As the speed decreases the generator runs more slowly and consequently produces less and less current.

With this style of brake, the life of the wheels is increased from two to three-fold, thus affording a saving in the item next in cost to the electric

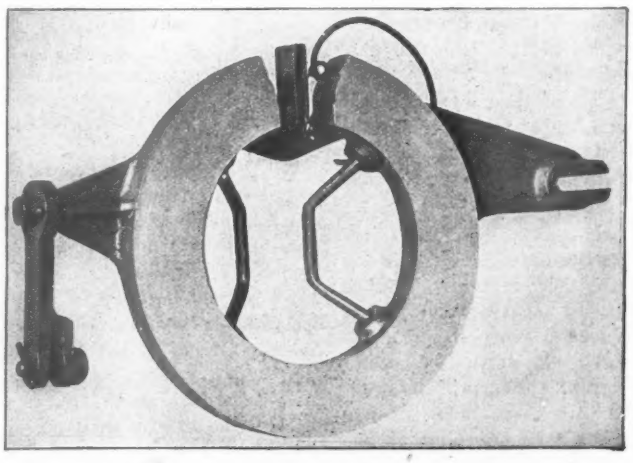

FIG. 9.

maintenance itself, to say nothing of the entire saving in brake shoes. This is emphasized in the fact that the brake shoes are being constantly besmeared with sand and grit thrown

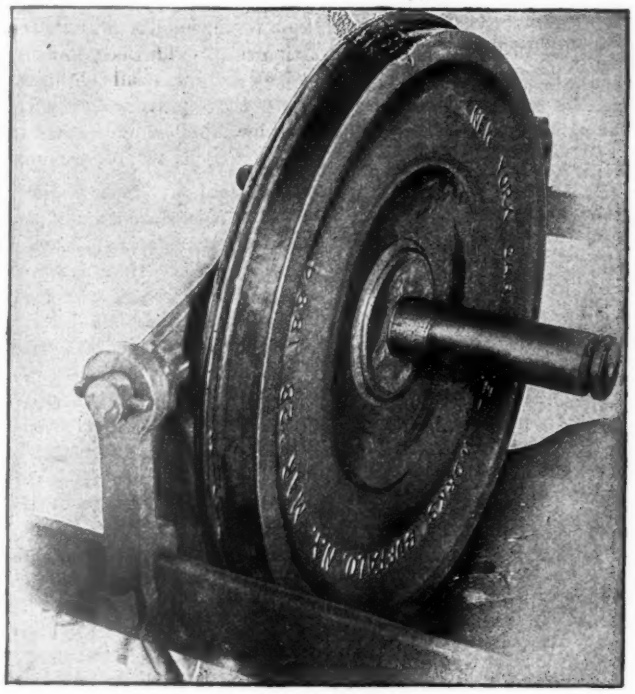

FIG. 10.

from the wheels, and when in this condition they are brought against the wheels with the tremendous pressures noted above. A better method could hardly be devised for reducing both wheel and shoe. We little realize the great number of brake applications necessary in a day's run. Careful record has been kept of this point, giving in three days an average of 1,377 brake applications per day for a run of about 164 miles.

Another interesting feature in this connection is that a flat wheel from skidding is an impossibility. It will readily be seen that should the wheels stop, the generator connected with the axles ceases to produce current, and none, therefore, exists to farther apply the brake, and though they may be sliding forward on the rail, yet the wheels continue to rotate more or less, and constantly present new surfaces for the sliding contact.

The braking action is two-fold and is especially efficient. The rotating armature of the motor, instead of tugging ahead by its momentum, is itself pulling back and more or less power-

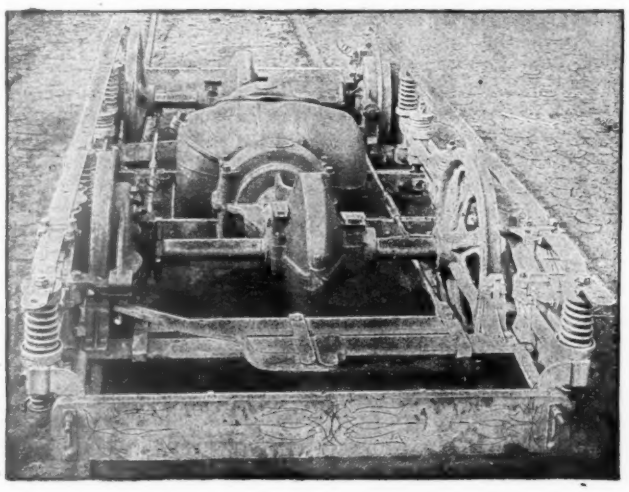

FIG. 11.

fully braking the car through the gears by the retarding effort of the magnetism of its field while generating the braking current. The power required, therefore, to perform this work is taken from energy of the moving car which it is desired to destroy; not only is the car thus retarded, but the electric brakes arrest the motion of the wheels direct, with a force that is remarkably powerful and under perfect control of the motorman.

Two forms of braking magnets are used, one for winding up a brake chain usually employed in connection with the trailer, shown in Fig. 4, and another for directly arresting the motion of the axles, one magnet only being used in connection with each axle, as shown in Figs. 8, 9 and 10. These magnets are truck-mounted, not an ounce of their weight being directly on the axle, and are so supported that their gravity acts to automatically retract them from the brake face (see Figs. 10 and 11), the latter showing the link standing out of the vertical. The brake face is automatically lubricated to a slight degree, receives a high polish and does not cut or rapidly wear. The brake is noiseless in its operation. It will be seen from the cuts that inasmuch as it does not revolve, no commutating or contact device is necessary. Its crescent form accomplishes important technical functions and also eliminates the necessity of pulling off a wheel for its attachment, removal or inspection. The brake is shown in position on truck in Fig. 12. Its face is solid unbroken metal, with no grooves or interstices for catching grit or sand, which in part explains the absence of wear above referred to. The brake magnet is practically indestructible, a few turns of stout wire constituting its one coil entirely enclosed and sealed in metal. No harm nor moisture can reach it. As to moisture, it is immaterial, as the electromotive force at which it works is extremely small, seldom reaching six volts. The lubricator for the brake surface is dry, not sticky or adhesive, and does not gather sand or dirt and retain it upon the braking face. No mechanical pressures whatever are employed to arrest the car, and hence no strain or shoulder wear comes upon the journals. In constructing the brake magnets, their proportions and the arrangement of the magnetic circuits received considerable study. It was during some preliminary experiments that an unexpected phenomenon was noticed; namely, that the retarding effect, when speed is an element, is very much more than would have been expected from the co-efficient of friction due to magnetic attraction or adhesion, this latter being a known and definite quantity. Farther experiment, made to ascertain the cause, showed it to be due to Foucault or eddy currents set up in the masses. The conditions and structure of the brake magnet were, therefore, varied in a number of particulars, especially such as would be expected to give the greatest result in Foucault currents produced. The result was immediately successful. It was found that the retarding effect of the brake magnet is due very much more to the generation of these currents than to the direct effect of the co-efficient of friction resulting from direct magnetic adhesion, the amount of which I find can be relied on accurately when employed by itself. Some of the forms of brake magnets experimented with were provided with numerous poles of opposite polarity, which were worked upon three different kinds of armature, two of which had radial teeth of different number relative to those in the magnet, and one being a plain disk armature. The toothed armature, while it causes a series of sudden jerks and is also unsatisfactory in the total retardation resulting from a given input, is found also upon rupture of the magnetic circuit to impart to the magnet coil certain counter electro-motive forces, which materially cut down the current supply and thus the capacity of the device. A magnet formed of a continuous disk, with an annular groove sunk in its face, is found to give very satisfactory results, but is much heavier and requires an armature twice as heavy for a given number of lines as the double circuit magnet shown in the figures. Furthermore, the relative rotation between such a magnet and its armature affords no point in the masses where the lines are interrupted or changed, and the Foucault currents, or reactionary effect set up, is very much inferior to those in a magnet where a gap or cessation of magnetic stress is continuously produced. As a result of these investigations the crescent form shown in the figures has been adopted, the opening in the crescent giving the effect referred to, as well as affording an excellent method of attachment and removal of the brake magnet, and at the same time supplying a gap for easily reaching the face for inspection and lubrication. A lubricator, see Figs. 8 and 9, is shown as occupying this space. The belief that the extra retarding phenomenon is that of Foucault or other eddy currents is borne out by the fact that a conducting lubricant, such as graphite, is found to considerably increase the effect, also metal filling between the polar faces is almost indispensable for the best result, while at the same time effectually protecting the coil from all damage. These observations would seem to indicate that the eddy currents, however produced, circulate in both masses near the surface, and traverse back and forth across the air-gap whenever ample provision is made to allow them so to do. The practical value of the combined action of all these forces in increasing the retarding effect results in necessitating but a small magnet, and a smaller current expenditure considering the work performed.

By reference to Table III, the result in retardation gained through the eddy or other currents may be plainly seen, column A indicating the retarding effect which should be expected from a friction coefficient of 10 per cent between the lubricated surfaces due to magnetic attraction of the lines actually circulating; and column B indicating the values of retardation actually obtained on the dynamometer.

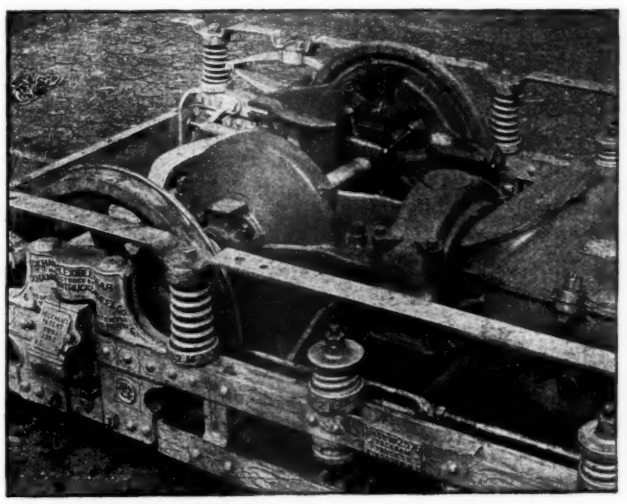

FIG. 12.

TABLE III.

Amperes.	Volts.	"A" Pull due to magnetic adhesion or traction. Friction co-efficient 10 per cent.	"B" Pull on brake chain obtained. Graphite lubrication.
5	1	7.6 lbs.	125 lbs.
9	1.8	16.3	300
9.5	1.9	36.4	608
15	3	121	1976
16	3.2	149	2432
20	4	158.4	2584
23	4.6	167	2736
25	5	186	3040
31	6 2	207	3385
35	7	213	3490
35.5	7.3	214	3500
41	8.5	223	3650

The assumed values are based on a traction of 28.26 pounds per square inch for 45,000 lines per square inch, being the assumed values at the knee of the curve easily recognized as occurring between 16 and 20 amperes in the table.

(Concluded next issue.)

THE CHLORIDE ELECTRICAL STORAGE BATTERY.

REPORT OF THE COMMITTEE ON SCIENCE AND THE ARTS, FRANKLIN INSTITUTE, ON THE INVENTION OF CLEMENT PAYEN.

HALL OF THE FRANKLIN INSTITUTE,

PHILADELPHIA, March 29, 1894.

The Franklin Institute of the State of Pennsylvania for the Promotion of the Mechanic Arts, acting through its Committee on Science and the Arts, investigating the "Chloride Electrical Storage Battery," finds as follows:

The sub-committee appointed to conduct this investigation has had this battery under careful consideration for a number of months, and has investigated the several features which are claimed to give it merit. During the larger portion of the time a number of cells have been in possession of the committee, and have been placed upon a regular working circuit under the control of one of the committee's members, where they have been subjected to exactly the same usage as a number of other storage cells of other makers and of the same size, so that opportunity was thus given to obtain the results of the performance of the chloride storage battery in regular use, which is ultimately the final test by which the utility of all inventions and improvements must be measured.

The results of this examination have led to the opinion that this battery embodies certain features of construction which prove it, both theoretically and as verified by use, to be a distinct improvement over hitherto known forms of storage batteries. In order to fully appreciate these features of improvement it will be necessary to recapitulate, briefly, a few well-known facts regarding storage batteries in general.

In all lead storage batteries, one of the objects desired is to obtain a large lead surface for small mass, as the capacity and discharge rates are strictly proportional to the amount of surface involved. This necessary maximum of surface has hitherto been obtained in one of two ways. The earlier way was to slowly eat out the lead plates by electrolysis until they had attained the requisite spongy condition, an affair of some time and expense. The later way—and the one which is generally practiced—is to cast a frame of lead, with raised right-angled ribs on each side, thus forming little depressed squares, or to punch a lead plate full of holes, which squares or holes are then filled with a pasty mixture of red oxide of lead in positive plates, and with litharge in negatives.

For several reasons cells made in this way have always given more or less trouble in service. In the first place, after continued use or during heavy discharges, a greater or less amount of mechanical disintegration of the positive plates would often take place, small fragments of lead and lead oxide dropping down between the positives and negatives, short-circuiting them and often causing further and more serious break-up, buckling and sulphating. Even when these particles are prevented from falling, their mechanical looseness causes poor contact with the supporting lead frame, thus entailing increased internal resistance and heating with diminished output. This disintegration appears to be due largely to the fact that the lead oxide paste placed in the holes is a mechanical rather than a chemical mixture, and hence that in changing from PbO_2 to $PbSO_4$ during the action of the cell, the molecules being only related to one another in a fortuitous manner, are easily broken up and thrust apart in the change of volume attending the chemical action. This, of course, seriously limits the life of a battery and its utility for public service.

In the chloride battery it is claimed, and the committee's investigations go to confirm the correctness of the claim, that the method of construction is such that this disintegration is far less liable to occur. This mode of construction is as follows:

Instead of cementing lead oxide paste into or against a lead framing in order to obtain the necessary active material, the latter is obtained by a strictly chemical process. Lead chloride is taken, mixed with a given proportion of zinc chloride, and this mixture is then fused and cast in small squares in suitable moulds. When thus cast the product is of whitish color and vitreous character, being quite brittle.

For the negative plates, these blocks are about ¾ inch square and $\frac{5}{8}$ inch thick, and are cast in groups of four, these groups being united by portions having, say, $\frac{3}{32}$ to $\frac{1}{8}$ inch thickness. For positives, the fused mass is cast in separate lozenges, each lozenge having a beveled V-shaped periphery. These cut squares or lozenges are then placed in a suitable mould, and a molten mixture of lead and antimony, in proper proportions, is cast about them under high pressure, thus fixing them securely in a firm lead framing of somewhat more than the usual density. (The feature of casting under pressure is an improvement in manufacture, due to Mr. H. Lloyd, who is connected with the American makers, and the process is protected by patents granted to him.) The connecting sheets of the squares making up a group and the V-shaped bevel of the lozenge serve to make their solidity of fixation exceedingly good.

The frameworks containing the chloride castings are then placed in a dilute solution of zinc chloride, together with plates of zinc, the frames and zinc plates being alternated with one another and in metallic contact. This combination is the equivalent of a primary battery "dead short-circuited." The chemical reactions which occur result in the removal of the zinc chloride and the chlorine of the lead, and there remains finally the dense framing containing squares or lozenges of spongy lead, which plates are then "formed" in practically the usual manner.

If a section of the spongy lead thus made be examined, it is found that the metal is in a crystalline condition, and that the crystals are all uniformly arranged with their longer axes perpendicular to the surface of the plate. This provides interstices, so that the changes of volume occurring in the chemical reactions of electrolysis may take place without exerting lateral pressure upon the crystals or otherwise crowding them into a condition of break-up. These crystals are not, of course, mechanically and irregularly bound together, but are related to one another according to the laws of molecular formation, and are, consequently, much more strongly bound together than if they had been mechanically combined.

Furthermore, this crystalline structure presents the maximum obtainable surface for the given mass, an infinite number of intercrystallic channels passing all through the material, and the entire plate being of the same thoroughly spongy consistency, except in those small portions where the continuous lead framing is encountered.

The effect of this extreme porosity and surface area is to give the battery a maximum capacity for a given weight and size of cell, an item of great importance when considered with reference to the demands of traction. Very heavy discharges also can be taken from this battery, owing to the interstices between the crystals permitting changes of volume to occur without mechanical violence to the structure.

While the method of construction just described seems to accomplish its anti-disintegrating function perfectly, it has been thought best by the manufacturers, in order that there shall be no doubt about the matter, to introduce between the plates a thin sheet of acid-proof fabric, so that any small particles which might fall away could not make metallic contact with two adjacent plates and thus short-circuit the cell. The fabric chosen for this purpose is woven asbestos cloth. It might be thought that the introduction of this asbestos would considerably increase the internal resistance of the cell, but the fact is otherwise, the resistance of the cell being not appreciably higher than that of other lead cells.

This is undoubtedly due to the fact that the larger part of the resistance of most lead cells is that caused by poor contact between the lead framing and the paste placed in it. In the chloride battery this contact is exceptionally good, owing to the pastilles of chloride being so firmly bound by the framing cast under pressure as to compensate for any resistance due to the asbestos.

These batteries are, and have been for several years, operating successfully and in very large numbers in the city of Paris, as a source of current for lighting purposes. A large plant has been in operation in this city in the building of the Provident Life and Trust Company for a year past, and a very large one has been installed at the station of the Germantown Electric Light Company, where it is said to have given, thus far, entire satisfaction.

The manufacture of this battery is protected by a large number of patents of the United States and of foreign countries. The essential features of the process of manufacture, however, are covered by the patents granted to Mr. Clement Payen.

Believing that this battery is a noteworthy and meritorious improvement upon many other forms of lead battery, tending to greater durability, greater capacity without increase of weight, and making possible heavier discharges without injury, the Institute, therefore, recommends the award of the John Scott Legacy Premium and Medal to Clement Payen, the inventor.

Adopted at a meeting of the Committee on Science and the Arts, held Wednesday, June 28, 1894.

JOSEPH M. WILSON, *President.*
WM. H. WAHL, *Secretary.*

Countersigned by

ARTHUR BEARDSLEY,
Chairman of the Committee on Science and the Arts.

The Cleveland Electric Club.

At the annual election of officers of the Electric Club of Cleveland, at their club rooms, October 3, the following officers were elected:

President—Charles W. Wason.

First vice-president—B. M. Barr.

Second vice-president — T. E. Adams.

Secretary—H. J. Davies.

Treasurer—E. W. Moore.

Board of Managers—Chas. W. Wason, H. J. Davies, R. M. Fuller, E. W. Moore, Geo. W. Cleveland.

The club is succeeding very nicely and has an excellent membership.

OBITUARY.

Mr. W. H. Gordon, formerly in the electrical supply business in this city, died at his home in Bergen Point, N. J., last week. An operation for apendicitis was the cause of his death. The deceased leaves a widow and three small children. Mr. Gordon had many friends in the electrical field, of which he had been an active member for 10 years past.

Mr. John C. English died at his home in New Haven, Conn., Sunday, September 30. Mr. English was prostrated some time ago with that dread disease cancer, and for several weeks before his death his condition was hopeless. He leaves a widow and three children.

Mr. English was the possessor of a large circle of electrical friends, and was extensively interested in electric lighting, at the time of death being secretary of the Bridgeport Electric Light Company. He was a genial, kindly-natured gentleman, and his friends will deeply grieve over his death, which came to him at the time when his life was the brightest. He was successful, rich and happy in all the relations of life. The ELECTRICAL REVIEW extends its sympathies to the bereaved family.

The funeral occurred Tuesday of last week at New Haven, and was largely attended. Mr. James English, who is widely known in electric circles, is a brother of the deceased.

Battery Manufacturers, Attention.

TO THE EDITOR OF ELECTRICAL REVIEW:

We are in the market for good batteries. Through your columns would you kindly ask battery manufacturers to send us their catalogue, and oblige

QUAST GAS AND GASOLINE ENGINE COMPANY.

Bucyrus, O., October 2, 1894.

ELECTRIC LIGHT FLASHES.

Only one man voted against electric lights at Hamilton, N. Y. Send us his photograph.

Grand Rapids wants its electric lights for less money, or it threatens to sell bonds and go into the business.

A Detroit paper asks, apropos of city lighting matters: "Are the Aldermen honest?" We give it up.

The Bath, Me., Electric Light Company has accepted the city's terms of $115 for each all-night light, $90 for each 2 o'clock light, a reduction of $5 each.

The city of Omaha is talking of tapping the water power of two rivers, the Platte and the Elkhorn, and convert it into electric power and light. A subsidy of $1,000,000 is asked.

The city of Detroit is still wrangling over that municipal lighting plant. Meanwhile the Detroit Electric Light and Power Company draws $14,000 a month for lighting the city.

Superintendent Young, of the Williamsport, Pa., Passenger Street Railway Company, has resigned. He has leased the electric light plant at Wellsboro, and will engage in business for himself.

About Storage Batteries.

To the Editor of Electrical Review:

I notice in your issue of the 3d inst., on the editorial page, the following paragraph:

"There is a sort of a dog in the manger attitude on the part of the owners of the Brush storage battery patents. Instead of apparently fighting to keep down improvement on the part of others in this important branch of electrical work, they should go to work, develop these batteries and benefit the public."

I presume that when you speak of the Brush storage battery patents, you mean this company—The Consolidated Electric Storage Company—who are the exclusive licensees of those patents. It is needless to say that I am surprised that a paper, generally so conservative and fair as your journal, should indulge in such wholesale condemnation and so at variance with the facts. It is true your statement is far from explicit, and gives no instance to support your position.

Your statement itself is composed of two charges; first, that we fail to go to work to develop the business ourselves; secondly, that we are fighting to keep down improvement on the part of others.

As to the first charge, that we fail to go to work to develop the business ourselves, permit me to call your attention to what this company and its predecessor, the Julien Electric Company, have done to advance the storage battery in this country. The officers and directors of this company are, with one or two exceptions, the same officers and directors that the Julien Electric Company had. Now it was the Julien Electric Company that first tested, in a commercial way, the availability of storage battery traction in this country, and in doing so expended a great deal of money in running cars on the Fourth and Madison Avenue lines in this city. For several months 10 electric cars were run between 85th street and the Post Office, and were probably run as well as any storage battery cars were ever run before or since. The result did not, in the judgment of the directors, justify the Julien Electric Company in further pursuing that branch of the business. It will be remembered how successfully the Julien Electric Company introduced electric car lighting in this country by the two trains of cars running between New York and Boston which were so splendidly lighted, until lack of terminal facilities at the Grand Central depot put a stop to the work.

During all this period batteries were being made and sold by the Julien Electric Company for lighting and the various uses to which storage batteries are put.

The Consolidated Electric Storage Company, successor to the Julien Electric Company, began business in April, 1890. I do not hesitate to state that during that time we have made and sold more batteries than probably all the other companies in the country combined; having sold in the four years ending April 1, 1894, nearly 20,000 accumulators or batteries, being the equivalent of 20,000 of our standard 17-S, 300 watt element. If there is any other company that can approach this number we shall be glad to hear from them, and we shall be glad to have you verify this statement for yourself by making an inspection of our sales books. These sales were made to 370 different customers. We have at present between 250 and 300 customers on our active list.

I am sure you will relent of your statement when your memory goes back one year to what we did in Chicago. Can you imagine a more meritorious enterprise than that of the World's Fair electric launches, the franchise for running which was obtained by the officers of this company, the capital for which was subscribed by them and their associates, although the work was carried on by a filial organization, the Electric Launch and Navigation Company, which, for business reasons, had to be organized for that purpose. This company has followed up that work by organizing the General Electric Launch Company, whereby there are now not less than 50 electric launches in actual service in this country, in addition to having furnished launches for various foreign countries, such as Russia, Germany, Italy and Canada.

I think I have given you facts enough to disprove your statement that we fail to go to work to develop the business ourselves.

Your second charge is that we are fighting to keep down improvement on the part of others.

I am at a loss to know who you mean by others. No one has ever come to this company with a business proposition for a license to manufacture and sell batteries and been turned away. As a proof of this I can cite that almost every storage battery company in the country is a licensee of this company, to wit: The Bradbury-Stone Electric Storage Company; the Eastern Electric Light and Storage Battery Company (Sorley battery); the Donaldson-Macrae Electric Company; the Accumulator Company; the Syracuse Storage Battery Company; the Accumulatorem-Fabrik Aktiengesellschaft (manufacturers of the Tudor battery).

Can the granting of licenses to these companies be interpreted as fighting to keep down improvements, when each is at liberty to manufacture its own type of battery and to sell it for all purposes whatsoever throughout the entire country?

It certainly can hardly be said that the attempt of a company to protect patent interests which have cost it hundreds of thousands of dollars should be regarded as playing "dog in the manger." The government has sought to reward genius and advance industry by creating a property right in the fruit of a man's invention. It would be a strange subversion of the right of property to interpret the enforcement of patent rights as being any more unjust than the bringing of an action at law to protect a man's home against unlawful enjoyment by another.

The Consolidated Electric Storage Company,
By Wm. Bracken, President.
New York, October 3, 1894.

The Smoke Nuisance in New York City.

[*From Frank Leslie's Weekly.*]

Something ought to be done to abate the smoke nuisance in this city. It is simply outrageous that the air within the city limits should be polluted as it is by great volumes of soot and noxious gases sprouted from thousands of chimneys. The Electrical Review, which is striving to arouse public attention to the necessity of some municipal action in the matter, points out that electricity, a perfectly clean agent, can be easily substituted for the present uncleanly and costly method of making and using heat:

"An electric current of sufficient volume to supply all the needs of a whole city, manufacturing and domestic, can be manufactured, so to speak, without the city limits and distributed at a price which would net the consumer a lower cash outlay than he now disburses to the coal barons—light, heat, power, locomotion, all ubiquitous and universal within city limits. This millennium is not far off. It wants only municipal organization and a city ordinance or two. The smoke nuisance will then disappear forever from sight and smell, and steam locomotives entering a city become a thing of the past."

May that good day come with swift pace!

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Corliss Engines a Specialty.
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Shafting, Hanger, Pulleys,
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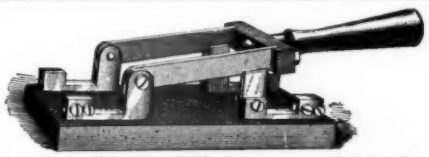
COMPLETE POWER EQUIPMENT.



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IRON, STEEL, COPPER AND ALUMINUM
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THE BELDEN MACHINE CO., NEW HAVEN, CONN., U. S. A.

THE PINTSCH GAS LIGHTING SYSTEM

Has been adopted as the STANDARD LIGHT by the Broadway and Third Avenue Cable Lines, of New York City; the North and West Chicago Cable Lines, and the Columbus Central Electric Line, of Columbus, O., also by sixty of the most prominent railways and by the Pullman and Wagner Palace Car Companies in the United States.

It has been the standard lighting system in Europe for many years, and is applied to 55,000 cars in Europe, the United States, South America, India and Australia.

For particulars address,

THE SAFETY CAR HEATING AND LIGHTING COMPANY,
160 Broadway, New York.

KINDRED INTERESTS

The Niles Tool Works, of Hamilton, Ohio, will have a fine display at the Atlanta Convention.

Lord & Thomas, the advertising agents of Chicago, send us an artistic little leaflet entitled "How We Helped."

The Jewel Belting Company, of Hartford, will have an exhibit at Atlanta next week. Mr. C. L. Tolles will represent the company.

The American Electrical Works, of Providence, R. I., will be represented at Atlanta by Mr. P. C. Ackerman, the New York representative of this highly successful wire manufacturing company.

The Okonite Company, Limited, will be conspicuous at the Street Railway Convention next week. The feeder wires of this well-known company are very popular in electric street railway circles.

Albert and J. M. Anderson, of Boston, Mass., are very extensive manufacturers of improved electric railway devices. Their Ætna railway insulators received the World's Fair award.

The Metropolitan Electric Company, Chicago, have taken the agency for the Commercial Electric Company's dynamos and motors, and carry a large stock from which to fill orders promptly.

Benedict & Burnham, of New York, and Waterbury, Conn., will be strongly represented at the Street Railway Convention. Their improved rail bond will be a center of attraction. Messrs. E. H. Oswald and J. H. Woodward will represent the company.

The Stirling Company, of Chicago, have just closed a contract with the West Chicago Street Railway Company for 8,000 horse-power water tube boilers. This is the largest boiler order on record, and aggregates nearly $100,000. Some of the old-time boiler houses have not yet recovered from their astonishment. The Stirling is a vigorous and wide-awake company.

The Metropolitan Electric Company, Chicago, have just arranged to take the product of a well-known glass factory for insulators, and they will be able to furnish the market with standard grades of insulators at factory prices. A large stock will always be kept on hand, and immediate shipments can be made. The Metropolitan Electric Company can be congratulated on this important connection, as it places them in closer touch with their competitors upon staple lines of goods.

Chas. A. Schieren & Company, of 47 Ferry street, New York, have an enviable reputation for their leather belts. They claim to manufacture a belt that is without a peer when lasting qualities and reliability are concerned. This long established and successful company has never catered to cheapening their belts and their goods today have a record second to none. Large belts are a feature of their manufacture.

The Mather Electric Company, of Manchester, Conn., report the following recent sales in their isolated lighting department:

North Packing and Provision Co., Somerville, Mass., 1,000 light dynamo, third order.
Hermann Aukam & Co., Lebanon, Pa., 600 light dynamo.
Church-Green Electric Light and Power Co., Boston, 600 light dynamo, ninth order.
Iowa School for the Deaf, Council Bluffs, Iowa, 600 light dynamo.
Connecticut River Paper Co., Holyoke, Massachusetts, 700 light dynamo; two 15 horse-power Manchester motors.
Henry R. Worthington, Hydraulic Works, Brooklyn, one 600 light dynamo; one 10 horse-power motor; one 45 horse-power 220 volt generator.
J. B. Williams Co., Glastonbury, Conn., 150 light dynamo.
Graif Bros., Lake Crystal, Minn., 150 light dynamo.
Ohio State University, Columbus, Ohio, 15 horse-power Manchester motor.
Grenada Hotel, Chicago, Ill., 450 light dynamo.
Barney & Smith Manufacturing Co., Dayton, Ohio, three horse-power Manchester motor.
H. T. Sturtevant & Co., Chicago, Ill., 10 horse-power Manchester motor.
G. M. Angier & Co., Boston, Mass., 100 light dynamo.
Candee Co., New Haven, Conn., 50 light dynamo.
Moorehouse Bros., Chanterico, 50 light dynamo.
Odd Fellows' Hall, Philadelphia, Pa., two 50 kilowatt direct connected; 80 kilowatt direct connected; 30 horse-power in motors.
S. N. Blake, Elmira, N. Y., 350 light dynamo.
Nardi-Strang Co., Philadelphia, Pa., 30 light dynamo.
George W. Furbeck, Chicago, Ill., 250 light dynamo.
C. B. Boothe, Los Angeles, Cal., two 5 horse-power Manchester motors; one 3 horse-power Manchester motor.
Badger Lumber Co., Kansas City, Mo., 100 light dynamo.
Leafe Bros., Winchester, Va., 50 light dynamo.
Stanley Laboratory Co., Pittsfield, Mass., 10 kilowatt exciter.
Diamond Machine Co., Providence, R. I., 300 light dynamo.
West Virginia Improvement Co., Pocahontas, West Virginia, 60 kilowatt 220 volt generator.

The Metropolitan Telephone Company, 18 Cortlandt St., now offers a new rate to small users—physicians, residences, private stables, &c.—$100 to $150 per year, according to use. Full long-distance equipment.

WHITE-CROSBY CO.,
CONTRACTING ENGINEERS,
Equitable Building, Baltimore, Md.
New York Office, 29 Broadway.
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Dynamos and Motors AND PARTS OF SAME
ALL KINDS PRICES OF PARTS TELEPHONES
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Will outlast anything in the market. Write for prices.
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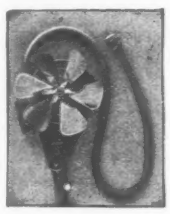

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SAMPLE, $6.00.
WHOLESALE AND RETAIL.
THE BOLGIANO MFG. CO.,
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These selected second-hand T Rails in good condition to relay:
60 lb. Steel, Western Pennsylvania or Eastern Ohio delivery.
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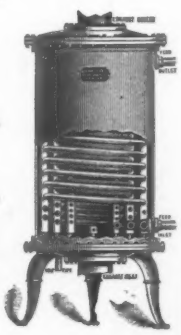
The National Feed Water Heater
HAS NO EQUAL IN
Efficiency, Reliability, and Low Price.
300 Electric Light Stations use it.
500,000 H. P. in daily use.
These facts are the best proof of its Superior Qualities.
THE NATIONAL PIPE BENDING CO.,
64 River St., New Haven, Conn.



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